

# NFC city context sensitive and social networking experiments\*

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## 1. NFC

NFC (Near Field Communication) tries to harmonize today's diverse contact-less technologies, enabling current and future solutions like access control, ticketing, payment, loyalty programs, discount coupons, and information collection and exchange.

The objectives of the *NFC city* project is to promote the development and use of services for information exchange, access, ticketing and payment through new applications of mobile and NFC technologies. IT will be achieved through the establishment of a complete NFC ecosystem including network infrastructure, trusted service manager (TSM) functionality, NFC services, and handsets. The idea is to reach a critical mass of users and to expose them for various services within a limited geographical area – a NFC city. The project will offer a toolbox for development of NFC services and stimulate service providers to test their applications and business models in realistic settings.

University of Tromsø is responsible for the development and testing of a set of standalone services, pilots and show-cases based on NFC read/write and NFC P2P functionalities. In this context these initial NFC experiments with context sensitive social networking applications have been performed [4]. The applications are implemented for the Android mobile platform communicating with servers running on traditional computers.

All applications developed on the Android platform have been tested on a Samsung Nexus S. The Nexus S runs Android version 2.3.4, and is the first modern NFC-enabled smart phone.

## 2. NFCPRESENTER

This Android application simplifies the user-computer interaction by creating a more intuitive way to present slide-

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show presentations. Traditionally, starting a presentation is a cumbersome process. The person doing the presentation usually has two alternatives; either connecting his own laptop to the projector, or transfer the presentation with a USB memory stick to a local computer which is already connected. Both routines are unnecessary tedious. The alternative, transferring the presentation to a USB memory stick, connecting the USB device to the local computer, navigating to the relevant file, opening it, and starting the presentation, is not any more tempting.

With *NfcPresenter*, starting a presentation can be done by selecting the appropriate presentation file on the mobile device, and touching it to a NFC tag present at the presentation location. Simple as that. When the presentation has started, the Android device serves as a remote control. With a swipe you can show the next or previous slide. In addition each slide is shown on the screen of the mobile device for better control.

*NfcPresenter* also lets the user download the currently active presentation to a mobile device. In other words, a spectator of the presentation can use the application to download the presentation to his own device by scanning a tag. This is a useful feature for distributing presentation material.

As explained, *NfcPresenter* utilizes NFC to collect the URL from a tag present at presentation location. The URL directs to a server running on the local presentation computer, which is already connected to the projector. The application uses the recently acquired URL to upload the presentation file to the server. The server starts the presentation, and can now answer to other commands to control it remotely.

## 3. NFCSAFARI

This tour guide application aims to help people discover, experience and remember interesting locations and spots. The general application area is giving tourists visiting cities and locations for the first time a helping hand by guiding them to interesting sightseeing spots. The overall goal of creating the application is to explore how NFC can be utilized in pervasive applications.

The application initiates the tour by using the current location of the user to find nearby spots. The user is given a choice between the three closest spots, and the user will start the Safari by choosing one of them. The next screen shows a map, guiding the user from his current location to the spot he chose.

When the user finds a spot, he needs to touch the nearby NFC tag to register his presence. By reading the ID of the spot, the application knows what web service to contact to download a description of the spot. If the user is logged in, we can now choose to share information about the spot through Facebook. It is also possible to give the spot a rating from 1 to 5 stars. When the user is happy with the experience he can continue the tour. The next spot is shown on the map, and the process starts from the top. All visited spots are stored in a local database.

In *NfcSafari* all sightseeing spots are predefined on the server. Spots are grouped together by Safari. The idea is to let spots in close vicinity to each other, or spots with the same theme, to be placed in the same tour. All tours are defined in XML files, where each file describes a single Safari.

Each Safari has an ID and a name, in addition to having a list of spots with names, IDs and location. When the server starts it parses all the Safari XMLs for spots and locations, which in turn is used when the Android application requests the closest spot. When this happens, the server computes the distance from the user to all active spots (from all Safaris) and returns a list of the three closest of them. When the user chooses one of them, the Safari it belongs to is chosen as the active tour, and the corresponding XML is downloaded. When the user is done with the current spot, the next spot is the next spot in the current Safari.

## 4. PARTYSHARE

This application brings multimedia from handheld devices to stationary devices in a seamless manner. It consists of a client running on a NFC enabled Android device, and a server running on a computer. The application lets you choose to share music or images from the android device to the computer in real-time. Simply touching the stationary device with the Android device does perform the transfer. As a result, the images are viewed and the music is played immediately.

In principle, *PartyShare* uses the HTTP protocol to transfer the multimedia from the Android device to the computer. This implies that the application could have been built without NFC technology. However, configuring such an application would be tedious. For instance, moving from one space to another would require the user to enter a new IP-address in order to interact with the current stationary device.

Entering a URL on a handheld device is time-consuming and cumbersome. By taken advantage of NFC technology we can remove the configuration step completely, and as a result get a smart and intuitive sharing application. The trick is to store the relevant URL in the NFC tag. This way the android application can read the relevant information directly from the relevant device, and get immediate feedback as his image is viewed, or the track is played.

On the client side we use internal Android activities to handle the camera and the gallery to choose image, and the Spotify meta-data API to choose music. The music sharing works by transferring a Spotify URI which is then used by spotipy to play the song.

## 5. ARE YOU THE ONE?

This quirky “love tester” calculates the compatibility between two persons. The goal of the application is to illus-

trate how NFC can be used in social scenarios. The application works by having the user enters his or her name, and then touch another handset with the same application. As a result their “love match”, or compatibility, is visualized on screen as a percentage.

The compatibility is calculated using users names, and obviously has no basis in reality. Nevertheless, it is a fun example of a small application that delivers something new by incorporating NFC as a vital component.

## 6. OTHER

A few other demonstrators has also been implemented, including the *Tagger* application used to read and write NFC tags, the *Collector* used to increase social interaction between mobile gamers, and *BluetoothChat* to set up a Bluetooth chat connection by touching each others phones.

## 7. CONCLUSION

NFC is a relatively fresh technology that is useful in many areas, such as payment, information sharing [6, 5], security [3], configuration, and social interaction [2]. It acts as a link between the physical and virtual world, giving us a simpler and more intuitive way of sharing information [1]. One of the properties of NFC is that context is implicit defined. This stems from the very short range of the tags. This can simplify many aspects of development, including security and configuration.

## 8. REFERENCES

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